UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/899,424	07/03/2001	Ravindra K. Shetty	H00-02101 (256.099US1)	3349

			EXAMINER
128 7590 02/17/2006			BROWN JR, NATHAN H

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ART UNIT	PAPER NUMBER
2121	

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	09/899,424	SHETTY, RAVINDRA K.
	Examiner	Art Unit	
	Nathan H. Brown, Jr.	2121	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _(3)_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _18 January 2006_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-62_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-11,13,15,18-28,30,32,35-42,45-55 and 57-59_ is/are rejected.

7)☒ Claim(s) _12,14,16,17,29,31,33,34,43,44,56 and 59-62_ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

UNITED STATES PATENT AND TRADEMARK OFFICE

Examiner's Detailed Office Action

1. This Office is responsive to the communication for application 09/899,424, filed January 18,

2006.

2. Claims 1-62 have been examined.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 13, 30, and 57 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply

with the written description requirement. The claim(s) contains subject matter which was not

described in the specification in such a way as to reasonably convey to one skilled in the relevant

art that the inventor(s), at the time the application was filed, had possession of the claimed

invention. The equation used in each claim is of unknown form and not described. The

expressions $(Rx_{(i\pm1)N} - R_{xiN})$ would have to be numeric for the use of less than (<) and greater

than (>) operations to make sense in the way they are being used (without further explanation).

(*Examiner assumes numeric values are being used.*) If numeric values are being used, then the

equality (=) implies that the equation is a Boolean equation where the Boolean truth values (T or

F) characterize the truth of $(Rx_{1N} - R_{xiN}) > ... > (Rx_{(i-1)N} - R_{xiN})$ and $(Rx_{(i+2)N} - R_{x(i+1)N}) < ... <$

$(Rx_{AN} - R_{x(A-1)N})$, since no known algebraic equation on the set of reals can be legally formed in

this way. However, if the truth of the right hand side of the equation is meant to imply the truth

of the left hand side of the equation, an implication (=>) should be used instead of an equality

(=). Also, the subscript A is not defined. Therefore, a person skilled in the arts of mathematical

pattern recognition or neural network design and implementation would be unable to make use of

the concept underlying the expression.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this
or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on
sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 3-11, 15, 18-28, and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by

Gorp et al., "An Interpolation Technique for Learning With Sparse Data", 2000.

Regarding claim 1. *Gorp et al.* describe a computer-implemented method for enriching sparse

data for machine learning (*see* Abstract), comprising: receiving the sparse data (*see* §III,

Examiner interprets the matrix U to contain the received data and to be sparse.); enriching the

received data around a deviation of the mean of the received data using a predetermined

distribution (*see* §III, p. 5/10, col. 2, lines 13-15, "...the measurements are noisy with known

(or experimentally determined) variances", *Examiner interprets "known variances" as variances*

from a predetermined—experimentally or otherwise—distribution.); and outputting the enriched

data for unbiased learning and improved performance during the machine learning (*see* p. 4/10,

Eq. 18 and p. 5/10, col. 1, Fig. 4, *Examiner notes that the 95% and 99% boundary of the input*

dimensional hypercubes correspond to confidence limits of the 95% and 99% confidence

intervals for scalar measurements and if the unknown population parameter of the confidence

interval is the mean of the sampled data, then the center vector, c, is a vector of sample means.).

Regarding claims 3-5. Claims 3-5 repeat claim 1 to emphasize sparse data input and therefore is

anticipated by *Gorp et al.* in the same manner as claim 1.

Regarding claims 6-11. Claims 6-11 assume that the input data belongs to multiple class sets

and the neural network training operates on each class data. It is anticipated by *Gorp et al.* as

data interpolation is inherent in single class or multiple class data preprocessing.

Regarding claims 15. Claim 15's "static data and real-time data" is anticipated by *Gorp et al.*

(*see* p. 2/10, col. 2, "2) The interpolation technique must be useful for noisy

and noiseless measurement data.", *Examiner asserts that noiseless measurement data is static*

data and noisy measurement data is real-time data.) *Gorp et al.* do not limit the measurement

data to either static or real-time.

Regarding claim 18. *Gorp et al.* describes a computer readable medium having computer-

executable instructions for performing a method of machine learning when only sparse data is

available, comprising: enriching the sparse data around a deviation of the mean of the received

data using a predetermined distribution; and outputting the enriched data for unbiased machine

learning (*Examiner notes that the data enrichment methods are run on a computer which,*

inherently, includes a computer readable medium.).

Regarding claims 19-28 and 32. Claims 19-28 and 32 depend on claim 18, either directly or

indirectly. These claims contain the same limitations as are present in claims 2-11 and 15. Since

the rejection of claim 18 is considered to be the same as that for claim 1, the rejection for claims

19-27 and 32 is considered to be the same as that for claims 2-11 and 15.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness

rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

6. Claim 2 is rejected under 35 U.S.C. 103(a) as being obvious over *Hassoun*, "Artifical Neural

Networks", 1995 in view of *Gorp et al.*

Regarding claim 2, *Hassoun* describes the method of machine learning wherein machine learning

comprises: supervised artificial neural network learning (*see* §3, p. 57). *Hassoun* does not

describe the method of for enriching sparse data. However, *Gorp et al.* do describe the method

of for enriching sparse data (*see* above, *Examiner notes that the method of supervised learning is*

independent and after the fact of the sparse data enrichment.).

7. Claims 35-42 and 44 and claims 45-55, 58-59, and 62 are rejected under 35 U.S.C. 103(a) as

being unpatentable over *Jakominich et al.*, "Real Time Digital Power System Simulator Design

Consideration And Relay Performance Evaluation", 1995, in view of *Gorp et al.*

Regarding claim 35. *Jakominich et al.* describe a computer system for a machine learning (*see*

§VII Conclusion) comprising: a storage device (*see* p. 119, Fig. 1, Data Acquisition System); an

output device (*see* p. 119, Fig. 1, Test Stations); and a processor programmed to repeatedly

perform a method (*see* p. 119, Fig. 1, NETOMAC). *Jakominich et al.* do not describe learning in

a sparse data environment, to repeatedly perform a method, comprising: receiving the data;

enriching the received data around a deviation of mean of the received data using a

predetermined distribution; and outputting the enriched data for unbiased machine learning.

However, *Gorp et al.* describe a method, comprising: receiving the data; enriching the received

data around a deviation of mean of the received data using a predetermined distribution; and

outputting the enriched data for unbiased machine learning (*see* above). It would have been

obvious at the time the invention was made to persons having ordinary skill in the art that

machine learning could be simulated with NETOMAC and incorporate the method described in

Gorp et al. for enriching the received data and then outputting or storing the enriched data for

machine learning.

Regarding claims 36-42. Claims 36-42 depend on claim 35, either directly or indirectly. These

claims contain the same limitations as are present in claims 19 and 23-28. Claims 19 and 23-28,

depend on claim 18. Since the rejected claim 18 is considered to be the same as claim 35, the

rejection of claims 36-42 is considered to be the same as that for claims 19 and 23-28

respectively.

Regarding claim 45. *Jakominich et al.* in view of *Gorp et al.* describe a computer-implemented

system for machine learning in a sparse data environment, comprising: a receive module to

receive sparse data (*see* p. 119, Fig. 1, Data Acquisition System); an analyzer to enrich the

received data around a deviation of the received data using a predetermined distribution (*see*

above, NETOMAC); and an output module coupled to the analyzer to output the enriched data

for unbiased learning and increased performance during machine learning (*see* above, Test Stations).

Regarding claim 46. Claim 46 includes a database in the computer-implemented system of claim 45. It is considered to be inherent to that a computer implemented system uses a storage medium to store data hence the database. The arguments for claim 45's rejection also apply to that of claim 46.

Regarding claims 47-54, 55, 57, and 58. Claims 47-54, 55, 57, and 58 depend from claim 45, either directly or indirectly. These claims contain the same limitations as are present in claims 2-9, 11, 13, and 15 respectively. Claims 2-9, 11, 13, and 15 depend from claim 1. Since the rejected claim 1 is considered to be the same as claim 45, the rejection for claims 47-54, 55, 57, and 58 is considered to be the same as that for claims 2-9, 11, 13, and 15.

Claim Objections

8. Claims 12, 14, 16, 17, 29, 31, 33, 34, 43, 44, 56, 59, 60, 61, and 62 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

9. Applicant's arguments filed January 18, 2006 have been fully considered but they are not

persuasive.

§112 Rejection of the Claims

With respect to the argument made against the §112 Rejection of the Claims, the applicant states:

> The terms objected to by the Office Action are merely part of a rearrangement an
> arrangement of enriched data into a max min max pattern. The data in the first pattern by
> definition should be equal to the data in the second pattern, but simply rearranged as
> shown at lines 8 and 9 of the claims.

Examiner, interprets "rearrangement an arrangement" as "rearrangement of an arrangement" and

respectfully, asserts that the use of an equation to describe a rearrangement of an arrangement

requires that the left hand side (LHS) and right hand side (RHS) of the equation represent an

equality of different expressions (one in the LHS and other in the RHS) related by the application

of the reflexive, symmetric, and transitive properties of equality; the rules of addition,

subtraction and negation; and the rules of multiplication (and division). Therefore the examiner

asserts that the use of the greater than and less than operations (> and <) is incorrect for the

purpose asserted by the applicant.

§102 Rejection of the Claims

With respect to claim 1, applicant asserts states:

> Claim 1 recites enriching the received data around a deviation of the mean of the received
> data using a predetermined distribution. This element is not believed shown or suggested
> by Gorp et al. Gorp et al. describes an interpolation technique, which is very different in

that it divides sampled data to be enriched into a fine grid and then interpolates data within linear sections in the fine grid. This is described on page 3/10, starting at the last paragraph in the first column. An example in Gorp et al., is provided starting in the second column of page 4/10. As seen in Fig. 1, a sine wave is sampled and broken into local linear sections in Fig. 2. and Fig. 3. Data is then created by interpolating within the sections as shown in Fig. 4. The process of Gorp et al., does not utilize the claimed "enriching the received data around a deviation of the mean of the received data using a predetermined distribution".

Examiner, respectfully, disagrees. Consider Eq. 16. The numerator of the exponential, $(c_j - x_i)^2$

is the squared deviation from the center (mean) of a local linear section, c_j, and a fine grid point,

x_i. *Gorp et al.* note that for a single input single output case, the sorted measurements can be

used as the fine grid points (*see* p. 3/10, col. 2, para. 1). Next, each measurement used to

calculate a local linear section is determined by whether its confidence interval overlaps the

segment $[u_k, u_{k+1}]$ (*see* p. 3/10, col. 2, para. 1) where $c_i = u_i + (u_{i+1} - u_i)/2$ (*see* p. 4/10, col. 1 , Eqs.

13 and 14). Therefore, each local linear section constructed around a deviation of the mean of

the received data in its neighborhood. Finally, the local linear sections are recombined using Eqs.

16-18 (*see* p. 4/10, col. 1, last para. to col. 2, first para.) to generate the interpolated points

(u_i, y_i). In addition, each local linear section is a linear regression (*see* p. 3/10, Eq. 8). The

parameters of each regression are predetermined at the time of the calculation of interpolation

points. Therefore, the rejection of claim 1 is maintained.

The applicant further states:

> The Office Action indicates that the element "enriching the received data around a deviation of the mean of the received data using a predetermined distribution" is shown at §III, p. 5/10, col. 2, lines 13-15, "... the measurements are noisy with known (or experimentally determined) variances". This is interpreted in the Office Action as

"variances from a predetermined experimentally or otherwise distribution." The context of the cited language from Gorp et al., is with respect to noise within the measurements, not for enriching the data. Further, the next sentence following the citation to Gorp et al., describes the grid forming concepts, and does not describe enriching received data around a deviation of the mean of the received data using a predetermined distribution as claimed.

Examiner, respectfully, disagrees. One of the general demands for an interpolative technique that *Gorp et al.* specify (*see* p. 2/10, col. 2, para. 2) states:

2) The interpolation technique must be useful for noisy and noiseless measurement data. In the case of noiseless data, a plain interpolation that maps each data point exactly, should be possible. In the case of noisy data, the interpolation should make use of the variance of the individual measurement points to weight data according to its significance.

Now, once the measurement data is partitioned into hypercubes defining the grid, the means of the subsets of measurements lying in the neighborhoods of the hypercubes, deviate from the mean of the whole data set and, again, deviations of means of the received data contribute to the calculation of the fine grid (*see* p. 6/10, Eq. 33) into which the interpolated data will be distributed.

The Office, therefore, maintains that all elements of claim 1 are shown in *Gorp et al.*

§103 Rejection of the Claims

With respect to claim 2, applicant asserts that:

Claim 2 was rejected under 35 USC § 103(a) as being obvious over Hassoun, "Artifical Neural Networks", 1995 in view of Gorp et al. This rejection is respectfully traversed. Claim 2 depends from claim 1 which is believed allowable. Claim 2 should be allowable

for at least the same reasons.Claim 2 depends from claim 1 which is believed allowable. Claim 2 should be allowable for at least the same reasons.

Examiner, respectfully, disagrees. Claim 1 is not allowable (*see* above) and thus the rejection of

claim 2 is maintained.

With respect to claim 35-42, and 44 and claims 45-55, 58-59, and 62, applicant asserts that:

> Claims 35-42, and 44 and claims 45-55, 58-59, and 62 were rejected under 35 USC § 103(a) as being unpatentable over Jakominich et al. in view of Gorp et al. This rejection is respectfully traversed. Claims 35-42, 44, 45-55, 58-59 and 62 all describe enriching received data around a deviation of the received data using a predetermined distribution. Since neither reference, alone or combined describe or suggest such an element, a prima facie case of obviousness has not been established, and the rejection should be withdrawn.

Examiner, respectfully, disagrees. *Gorp et al.* alone, describes enriching received data around a

deviation of the received data using a predetermined distribution by interpolation. The rejections

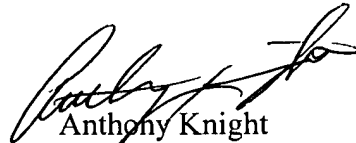are maintained.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy

as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing

date of this final action.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner

should be directed to Nathan H. Brown, Jr. whose telephone number is 571-272- 8632. The

examiner can normally be reached on M-F 0830-1700. If attempts to reach the examiner by

telephone are unsuccessful, the examiner's supervisor, Anthony Knight can be reached on 571-

272-3687. The fax phone number for the organization where this application or proceeding is

assigned is 703-872-9306. Information regarding the status of an application may be obtained

from the Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR. Status

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information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions

on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-

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Nathan H. Brown, Jr.

February 3, 2006